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ARCTIC RESEARCH AND POLICY ACT OF 1983

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Mr. ROTH, from the Committee on Governmental Affairs, submitted the following

REPORT

[To accompany S. 373]

The Committee on Governmental Affairs, to which was referred the bill (S. 373) to provide comprehensive national policy dealing with national needs and objectives in the Arctic, having considered the same, reports favorably thereon with amendments and recommends that the bill as amended do pass.

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I. Purpose of the Bill

The Arctic Research and Policy Act lays the foundation for a sustained, policy-guided scientific research effort in the Arctic through the creation of an Arctic Science Policy Council and an Arctic Research Commission. The creation of a comprehensive national Arctic research policy in concert with a sustained research effort will allow the Nation to continue to develop the vast renewable and nonrenewable resources of the Arctic in an expeditious but responsible manner. A comprehensive Arctic research policy and a sustained research effort is also important to stated U.S. national security objectives. Also, the resolution of a wide variety of other current and unanticipated future problems ranging from Arctic pollution to potential global climatological changes will be made possible by the expansion of the "Arctic data base" that will occur as a result of new and better coordinated research activity in the Arctic.

Currently, there are approximately 15 Federal agencies conducting some form of scientific research in the Arctic. Additionally, State agencies, universities, private industry, and local governments undertake a variety of Arctic research projects. There is little formal communication among these different groups, which has resulted in a long history of duplicative and unnecessary research. More troublesome has been the underfunding and lack of research in some areas.

Despite the clear need for a sustained national commitment to Arctic research, the United States lags behind other circumpolar nations in Arctic research. Of all the circumpolar nations, only the United States is without a national institute, laboratory, or other organization devoted to the sustained planning and support of Arctic research.

S. 373 addresses that by creating a five-member Arctic Science Policy Council to develop a comprehensive national Arctic policy and to supervise its implementation. The Policy Council, in cooperation with the Department of State, would coordinate and promote cooperative Arctic scientific research programs with other nations in addition to coordinating Federal research efforts with State and local governments.

The legislation also creates the Arctic Research Commission, a nine-member body appointed by the Arctic Science Policy Council. The Commission, with the Executive Director it can appoint, would undertake a survey of existing research efforts, identify and prioritize research needs, and make grants for curently neglected Arctic research determined to be in the national interest. The Commission would also establish an Arctic data collection and retrieval center to serve as a clearinghouse for scientific data. The operation of the Council, Commission, and data center would be funded by an Arctic Research Fund containing appropriated funds from the Federal Government, the State of Alaska, and private individuals and organizations.

The committee expects that these efforts will lead to a comprehensive policy for basic and applied scientific research in the Arctic. Research is important to the responsible development of Arctic resources, the meeting of important national security objectives, and the creation of a broad data base helpful to the resolution of a wide variety of current and future problems.

II. Legislative History

Senator Frank Murkowski, with Senators Ted Stevens, Henry Jackson, and Slade Gorton cosponsoring, introduced the Arctic Research and Policy Act, S. 373, February 1, 1983. This bill was a successor to S. 1562 introduced by Senator Murkowski with Senators Stevens and Jackson during the 97th Congress.

S. 1562, introduced July 31, 1981, was referred to the Committee on Governmental Affairs. Hearings were held during 1982 in Fairbanks, Alaska (April 7, 1982) and Washington, D.C. (June 17, 1982). The bill was ordered reported September 30, 1982 and placed on the Legislative Calendar. A committee report, Senate Report 97–660, was subsequently filed October 18, 1982. The legislation passed the Senate December 10, 1982 and was referred to the House Committee on Science and Technology's Subcommittee on Science Research and Technology. No further action was taken.

S. 373, following introduction February 1, 1983, was referred to the Committee on Governmental Affairs and then to the Subcommittee on Civil Service, Post Office, and General Services. The subcommittee approved the bill for full committee consideration March 17, 1983. The Committee on Governmental Affairs ordered S. 373 reported with amendments March 17, 1983.

III. A History of Efforts To Create an Arctic Research Policy

The attention of Congress was first directed toward the lack of a comprehensive national Arctic research policy in the 1960's when Senator E. L. "Bob" Bartlett from Alaska noted a disparity between the funding of Antarctic projects and Arctic projects. Senator Bartlett argued that since the United States was an Arctic-rim Nation, Arctic research should be given the same or greater attention as research in the Antarctic. Senator Bartlett, a member of the Appropriations Comittee, had the Legislative Reference Service of the Library of Congress prepare a report on United States Arctic reresearch. (A report for the Committee on Appropriations, U.S. Senate, 90th Congress, Senate Document No. 71.)

Joseph Fitzgerald, Chairman of the Federal Committee for Development Planning in Alaska (established following the 1964 Good Friday earthquake), in conjunction with Senator Bartlett's efforts, initiated discussions with Federal agencies and departments of Arctic policy. The result of these discussions was the presentation to President Lyndon B. Johnson in 1968 of a comprehensive Arctic policy statement. The statement included a discussion of the need for a comprehensive Arctic scientific program. The statement was not acted upon, however, by President Johnson before he left office in early 1969.

Coming out of these early efforts was the establishment of the Interagency Arctic Research Coordinating Committee (IARCC) in 1968. The committee was reorganized in 1972 as an interagency committee of the Federal Council for Science and Technology (FCST) with the National Science Foundation taking the lead role. The IARCC was disbanded in 1978 as part of the President's Reorganization Plan #1, Executive Order 12039.

The National Security Council (NSC) adopted NSC Memorandum 144 in 1971 creating the Interagency Arctic Policy Group (IAPG). The Group was to develop a coordinated plan for scientific research in the Arctic. Memorandum 144 was reaffirmed in 1973 by NSC Memorandum 202. An attempt by IAPG to create an Arctic research policy founded in 1982 when disagreement among IAPG agency members prevented issuance of their report.

The *Study of United States Arctic Research Policy*, mandated by Section 1007 of the Alaska National Interest Lands Conservation Act, Public Law 96–487, noted the continuing inability of the United States to establish a coordinated Arctic research program because of the lack of an explicit Arctic research policy to provide the needed guidance.

IV. Research Needs in the Arctic

The development of a sustained, policy guided research program in the Arctic will chiefly benefit the Nation in the following general areas:

(1) It will allow the refinement of development-related permit processes associated with resource development in the Arctic.

(2) It will assist in the development of technologies associated with the development of renewable and nonrenewable resources in the Arctic.

(3) It will broaden the Arctic scientific data base useful to the resolution of defense related questions.

(4) It will broaden the data base and provide for international cooperation with respect to Arctic pollution, the climatological effects of atmospheric carbon dioxide, and other phenomena with international and global implications.

(5) It will provide information necessary to the resolution of human health and habitation needs in the Arctic.

A discussion of several of these areas follows:

A. NON-RENEWABLE RESOURCE DEVELOPMENT

The Arctic represents the Nation's storehouse of oil, gas, coal, and non-energy "hard rock" minerals. According to the National Petroleum Council's Report on Arctic Oil and Gas, released in December 1981, the Arctic contains 24 billion barrels of recoverable but undiscovered oil in addition to 109 trillion cubic feet of natural gas. Other sources have estimated that Alaska contains over one-third of the total U.S. onshore reserves of oil, and almost 60 percent of total U.S. offshore reserves of oil. Moreover, some estimates of total reserves of natural gas both on and offshore in the Alaskan Arctic range as high as 260 trillion cubic feet.

Although measured coal resources in the Alaskan Arctic are relatively low due to the fact that area has not yet been fully explored, there is a hypothetical geological potential for more than 1.5 trillion tons of coal in Alaska north of the Arctic Circle.

High to moderate potential "hard-rock" (metallogenic) mineral deposits extend in a wide band across the Arctic region in Alaska. Gold, silver, lead, zinc, copper, platinum, tin, tungsten, asbestos, chromium, molybdenum, barite, beryllium, and fluorite are known to

exist in the region. Preliminary exploration indicates that uranium minerals may also exist in the Arctic. The strategic and monetary value of these reserves to the United States is undoubtedly immense.

As the development of these resources continue, several broad policy issues must be addressed:

(1) What is the susceptibility of the Arctic environment to disruption brought about by man in pursuit of Arctic resources? What will be the effect of such disruption, and how can such disruptions be minimized?

(2) What impacts will development have on the lifestyles, values, and culture of the Native and non-Native population of the Alaskan Arctic? How can those impacts be mitigated?

(3) How can cost-effective development technologies compatible with reasonable environmental protection be best developed? What is the Federal role in the development of Arctic technology?

(4) Are the Federal agencies equipped to fulfill their regulatory and oversight missions related to Arctic resource development? Do existing development-related Federal permit processes require too much information or not enough?

The last point is of particular interest in light of a General Accounting Office (GAO) report issued on June 17, 1982. That report, entitled "Developing Alaska's Energy Resources: Actions Needed to Stimulate Research and Improve Wetlands Permit Processing," stressed the need for additional Arctic research and called for changes in the Army Corps of Engineers' wetlands permitting process. As the report summary states:

> Additional research is needed to evaluate the impacts of oil and gas-related activity in Alaska as a basis for promoting environmentally sound approaches to future development without unnecessarily increasing its cost. Such efforts should provide site-specific data to allow the tailoring of protection measures suitable for the areas to which they are applied, and to minimize universal or blanket stipulations where they are not necessary.
>
> The Corps of Engineers has been slow in processing wetlands permits, required for many oil and gas projects in Alaska, and has frequently included controversial and costly conditions—such as seasonal drilling and waste disposal restrictions—in its permits, without requiring substantiation of their need through research findings and site-specific data.
>
> Congress should provide for three critical elements—coordination, prioritization, and a source of funding—when considering legislation to establish an Arctic research policy, and Federal and State agencies should use research findings and site-specific data to the maximum extent possible in support of permit stipulations. (From GAO/EMD–82–44: June 17, 1982)

In the committee's view, the GAO report strengthens the arguments for more effectively planned and implemented Federal research in the Arctic. The committee believes this legislation represents a timely legislative response to the problems specified in the report.

At the request of the committee, the Office of Technology Assessment prepared a series of staff discussion papers designed to identify

key research needs in the Arctic. These papers, the GAO report, and other materials in the hearing record identified other research needs as well. The research needs related to nonrenewable resource development are discussed below.

The degree of Federal responsibility to participate in the conduct of the research mentioned below varies. Clearly, the private sector, State and local governments, Alaska Native corporations and associations, and colleges, universities, and research institutes conduct a great deal of this research and will continue to do so.

The committee does not intend, by including this list, to suggest that all of these research topics must be a part of any Arctic research agenda nor to imply that more research in any areas listed must be conducted. Rather, the list is illustrative of the breadth of research which is being, or may be, conducted and which would be better coordinated under the legislation.

Research needs related to offshore oil and natural gas development

There have been numerous studies identifying research needs for the development of offshore Arctic resources, including those of the Polar Research Board, the Marine Board and the Marine Transportation Research Board—all of the National Academy of Sciences. These studies have been undertaken for the Department of the Interior, Department of Transportation, and the Department of Energy, among others. The Arctic Research Program of the National Science Foundation has also contributed to the Federal effort. Industry, through the Alaska Oil and Gas Association (AOGA), has sponsored investigations of specific problems. Groups such as the Alaska Eskimo Whaling Commission have also conducted environmental investigations.

The Federal role in the past has in part been one of cooperation with industry. Petroleum industry projects have included the use of government laboratories and expert personnel. Some programs which benefit both industry and government have been jointly managed and funded. Policies to encourage future cooperation among government, industry, and Arctic residents will help ensure long range commitments to research in the complex Arctic environment.

Continuing study of the engineering properties of sea ice, including single-year, multiyear, and conglomerate ice is needed. The dynamics of the interactions of sea ice with ships and marine structures during wave-driven storm conditions are critical, as is the collection of ice keel and ice scour data and analysis of ice-sea floor interaction dynamics. The effects of the force of large ice features, such as pressure ridges, on test structures needs to be better understood through field studies. The committee wants to emphasize that continuing dialog with the indigenous people of the Arctic is critical to a complete understanding of Arctic conditions.

Many benefits would accrue from the development, evaluation and acquisition of remote sensors, both aircraft and satellite-mounted. These could provide ice and meteorological data and other information required for navigation, communications, resource development, and environmental monitoring.

More ice-breaking research north of the Bering Straits is needed before year-round marine transport can be considered reliable or

environmentally acceptable. Both the Coast Guard and industry energy production systems would benefit from this research.

Basic biological research must be done to determine the effect of oil pollution on the food chain, and to test various models for oil clean-up. In addition, sociocultural research into the consequences of resource development on the lifestyle of the residents should be undertaken.

Above are only a few examples of problem areas related to Arctic offshore development. Development is now in very early stages, and as activities expand in the future, research needs will also increase.

Research needs related to onshore oil and natural gas development

Although there has been onshore development and production of oil and natural gas, there remain some areas ripe for research. Current resource estimates suffer from limited understanding of the basic geology and geophysics of the Arctic. Continuation of efforts to secure an extensive geological data base, using geophysical and remote sensing techniques, would support a better understanding of geological conditions and would be helpful for future exploration efforts.

The large gas hydrate resources found in the Arctic could greatly extend the production life of the North Slope if economic ways to extract the hydrates from the permafrost could be found without damaging the physical environment. Similarly, research on producing heavy viscous oil would be useful since normal methods of steam drive may damage the permafrost.

Although seismic exploration, the principal method for oil and gas exploration is used extensively in the Arctic, there are still unknowns about the effects of permafrost on the attenuation or distortion of seismic signals. Better understanding of low frequency wave propagation through the frozen ground as a function of temperature and depth of the permafrost is necessary.

Research needs related to solid energy fuels.

If large scale peat harvesting becomes possible in the Arctic and sub-Arctic regions of Alaska, research will be needed to find ways to avoid damaging the permafrost and tundra in which the peat lies. Peat utilization will require research into gasification, solidification, and liquefaction technologies particularly suited to the Alaskan environment. Of special interest would be small systems that could be used at the site of use.

Research into synthetic fuel production from the large Arctic coal researves would also be valuable. Special problems include the effects of large scale water removal to supply steam for the synthetic fuel production, and the effects of large scale heat dissipation (from the process plant) on permafrost regions.

Prior to any large construction of, for example, synfuel plants, or facilities to convert natural gas to methanol, research is needed into the behavior of permafrost, the properties of moisture-laden soil around large structures and the protection of wildlife habitat. Currently, gravel pads and pile foundations are used to support most structures at Prudhoe Bay. Chemical processing plants there or in the sub-Arctic may have to be set directly in the ground on pilings. The thawing and refreezing of the ground can cause severe problems.

Improved research into frozen ground soil mechanics is essential in large construction is to take place in frost-sensitive soils.

Research needs related to energy conversion

Much of the research appropriate to development of energy conversion and chemical processing is related to construction, water removal, and heat dissipation described earlier. There are other areas of value.

Waste disposal techniques encounter special problems in the Arctic and sub-Arctic. The effects of waste materials on soil composition should be examined. Better monitoring of the air quality in the regions and examination of potential pollutants will be useful in setting air quality criteria. Finally, if a chemical processing industry is set up in Alaska, it will be useful to examine the effect of the cold climate on continuous operation of chemical processes.

Research needs related to energy end use and conservation

Research into building techniques and siting in the Arctic and sub-Arctic will be helpful in creating more energy-efficient buildings. Research into building and insulating materials to reduce heat loss in Arctic and sub-Arctic buildings will be of continuing value in temperate regions of the United States as well.

The development of on-site energy systems using peat, coal or other biomass resources will require research into siting, waste disposal, pollution control and transportation on a small scale. Such research has wide applicability to conditions in the 48 contiguous States as well.

Research needs related to the development of coal and hardrock minerals

Since there is little large-scale commercial mining underway, little is known about the operational problems and impacts of Arctic and sub-Arctic mining. The only exception is the onshore and offshore extraction of sand and gravel, where additional research is needed on the impacts of removal on the physical environment, Arctic residents, fish and wildlife, and water resources and quality.

Information from pipeline construction and oil and gas activities is useful, but there are important differences between these projects and mining. Additional research is therefore needed. Because large scale Arctic mineral development is not expected to be commercially viable in the near future, the opportunity exists to compile baseline information on climate, wildlife, hydrology, permafrost, and vegetation and to test on a small scale the effects of disturbances similar to those created by large-scale operations. The success of mitigation and reclamation efforts can be evaluated before decisions are made about approving commercial-size mines or regulating their operations.

Analysis of Arctic and sub-Arctic mining operations in other countries should be conducted. Initial Alaskan development projects should be monitored closely and information derived from these experiences shared with prospective developers, local residents, and government agencies.

Government and private efforts in mineral exploration and assessment would benefit from improvements in the application of mineral surveying technologies such as remote sensing, satellite and aerial

photography, geochemical analyses, and seismology over large unexplored areas. An inventory of potential resources is necessary for land management. Exploration and mapping activities by Government agencies at the current pace could go on for a long time before most of Alaska is surveyed. If more cost-effective and efficient methods were developed, the time and effort required to complete surveying would be reduced.

Each phase in the life of a commercial mining venture has different requirements for access to lands. In exploration, large areas are surveyed to identify promising mineral areas for more intensive examination. During development, personnel and equipment must be brought to the site. During commercial extraction, more personnel, equipment, and supplies may be necessary. Finally, the product must be shipped to processing and marketing facilities. There is a need to develop suitable types of transportation to support each phase of commercial activity.

Expanded access, however, has potential consequences for conservation units (e.g. National Parts, Fish and Wildlife Refuges, etc.), the natural environment, and local communities. Additional work must be done to identify these impacts, their extent, and possible mitigation strategies. This research would assist in selection of access modes best suited to the needs of the mineral developer and to protection of the environment.

In its announcement of planned leasing of offshore areas for mineral development, the Department of the Interior noted that the areas would not be leased before environmental studies were completed. Additional research is required to identify potential impacts of offshore mining, and to identify any special technological requirements for such operations. So far, no significant offshore mining minerals has occurred in Arctic waters. The importance of the areas for subsistent economic activities, and the possibility of adverse impacts on wildlife and fisheries must remain a top priority for research.

RENEWABLE RESOURCE DEVELOPMENT

Although the issues arising over the responsible development of oil and gas are generally at the center of controversy related to Arctic resource development, the responsible development of renewable resources would also benefit from a coordinated Arctic research program. Arctic fisheries currently represent the cornerstone of the Arctic's renewable resources.

Alaska leads the Nation in the value of fish landings. It provides 25 percent of the Nation's total value of fish landed. In 1981, Alaska landings were worth $639 million and products were worth about $1.5 billion. Most of these landings occurred in Bristol Bay, one of the Arctic's richest fishing grounds and an area covered by this Act.

In addition, Alaska has the largest underutilized fishing resources in the Nation. Of the total 2.6 million metric tons of exploitable fishing resources in the Fisheries Conservation Zone (FCZ) of the United States, 2.0 metric tons lie off Alaska. Only .4 of the 2.0 million metric tons are presently utilized by the U.S. fishing fleet, and for the most part, this resource lies in the region north of the Aleutian Islands.

Alaska provides 70 percent (or about $624 million) of the Nation's export of U.S. fishery products (excluding products from "joint venture" operations with foreign nations). Over half of the Nation's fish exports are salmon products, most of which originate from the Bristol Bay Area.

It is difficult to measure the assets that will accrue to the Federal Treasury as a direct and indirect result of the development of Arctic fisheries, but they will be substantial.

Data on Arctic and sub-Arctic ground fisheries has been gathered for a relatively short period of time, and knowledge about them is limited. Consequently, there is a considerable need to continue data collection and analysis for research purposes as well as for determining proper catch allocations. Good information provides a sound basis for understanding population dynamics upon which fishery management decisions must be based.

Research, including data collecting and model building, to obtain projections of optimum yield for long time periods would be valuable. It would provide information to the fishing industry on which to base decisions about capitalization for new vessels and processing facilities. Planning the capital formation and construction of fishing ships takes considerable time. Additional research to enable the Department of Commerce to provide quantitative long-range forecasts of allowable catches 2 to 3 years ahead would reduce financial risks and enable industry to make better use of its funds and manpower. In addition, research into fish-processing techniques to prevent deterioration would greatly improve the U.S. fishing industry's operations and economic viability.

Progress has been made in using sonar systems as a management tool for estimating populations of certain species. However, use of sonar for minimizing incidental catch could be better developed. Further research is necessary to reduce the survey costs associated with stock assessment and to improve incidental catch avoidance techniques.

For fish canning, research into inspection procedures and requirements could minimize defective can closure and associated risks. Spectrometric examination techniques might detect certain types of faults. Research is needed to find more effective ways to pinpoint contamination in the canning process.

The committee notes with interest the recent development of commercial halibut fishing in the Bering Sea. Local fishermen landed more than 8,000 pounds of halibut in 1982, which made the fishery economically self-sufficient. Fishery ventures of this kind should be encouraged. One way to encourage development is to accumulate basic data about the resource and about general ocean and climate conditions.

Continued Federal support for science and technology efforts in developing Arctic and sub-Arctic fisheries will help manage a valuable natural resource and benefit an important industry. The coordination of research by industry, the military, local residents and scientists on such topics as offshore energy, oceanography, weather and climate, and engineering in the Arctic environment would benefit fishery development as well. Since Federal science programs are scattered among several agencies, a policy that provides a mechanism to coordinate them would bring savings in many areas.

Of course, fisheries do not represent the full extent of renewable Arctic resources. Arctic agriculture has an underdeveloped potential that could benefit from sustained Arctic research and the development of a broad Arctic data base.

The Office of Technology Assessment published "Impacts of Technology on U.S. Cropland and Rangeland Productivity" in August 1982. That report states that 18.5 million acres of Alaska land are suitable for agricultural production. In addition, there are 100 million acres of tundra suitable for reindeer grazing that are currently unused. These facts only begin to convey the potential for Arctic land to support grain production and to produce high-quality protein.

The technologies that will permit development of Alaska's agricultural potential may also be applicable to agricultural problems in more temperate zones, particularly northern tier states of the continental United States.

In summary, the development of the Arctic's vast potential of renewable resources will require careful planning based upon sound sicentific data. In the absence of an Arctic research policy and a sustained, comprehensive research effort in the Arctic, a significant and costly potential exists for irresponsible and short-sighted development on the one hand, or over-regulation and unwarranted constraints on the other.

C. OTHER RESEARCH NEEDS

Research needs related to national defense

The hearings held on the Arctic Research and Policy Act during the 97th Congress gave the committee cause for concern with respect to the shortcomings of defense- and security-related research undertaken by the U.S. Government in the Arctic. In spite of the fact that the Alaskan Arctic is strategically located on both the Arctic and Pacific rims and represents our only common border with the Soviet Union, there is little defense-related research underway in the U.S. Arctic. This fact is best exemplified by the recent closing of the Naval Arctic Research Laboratory in Barrow, Alaska.

There is litle doubt that the broadening of the basic polar research data base could assist the Department of Defense in addressing a number of questions crucial to our defense capabilities. For instance, how would the guidance systems in our "over the pole" ballistic missiles operate under the intense auroral displays or magnetic disturbances common to the polar regions? How do higher latitude space disturbances affect orbital or over-the-horizon surveillance systems? Only basic, sustained Federal research can provide the foundation for the resolution of these and other defense-related questions.

Research needs related to weather, climate, and arctic pollution

Both short term and long term research is needed to improve understanding of the cause-and-effect mechanisms of Arctic weather; and more information is required to improve forecasting capabilities. Some types of research problems require multi-nation participation because of the wide expanse of territory involved. Observational programs require improvement in instrumentation. Especially in the far North, remote weather monitoring stations using satellite data transfer are needed to gather information required for improvements in regional

weather forecasting. In addition, forecasting techniques for Arctic regions, including the prediction of marine conditions and shoreline storm surges, require development.

There is a need to monitor, survey, and forecast ice conditions, especially the time of Arctic ice break-up. Shipping, fisheries, and resource development industries, the Coast Guard, and Arctic residents would all benefit from this effort. Shore-located, aircraft-mounted, and satellite systems could make up the monitoring system.

The Federal Government, through the Department of Commerce, now participates in several important climatic research programs with other countries. Further research and understanding of Arctic climatic conditions is essential to understanding global climatic conditions and patterns.

Continuing development of global and regional climate models is required to permit forecasting of climatic changes with scientific confidence. Large scale Arctic meteorological-oceanographic heat balance observation programs are necessary to provide data for these models.

Continuing observation programs are necessary to monitor climate trends (i.e., open water observations for a long period). Polar orbiting satellites equipped with ice measuring sensors and sensors for weather/climate and sea condition measurements could collect data over large areas.

Knowledge concerning the indigenous peoples of the Arctic is a unique science resource that could be developed to better understand all aspects of the climate in the Arctic.

Scientists at the Lawrence Berkeley Laboratory have recently discovered that the Arctic may be polluted with large concentrations of black soot particles and pollutants which did not originate in the Artic. Some computer models suggest that a catastrophic "greenhouse effect" might occur as a result of these pollutants. The resutling rise in global temperature could, it is speculated, partially melt the polar ice caps, seriously affect the distribution of rainfall and create arid conditions in currently producing agricultural areas. The understanding of this problem will certainly require international scientific cooperation.

Research needs related to arctic health and human habitation

In the view of the committee, Arctic health research deserves attention within the larger context of an overall Arctic Research Policy. The pace and scale of developmental activities in the Arctic are accelerating with resultant increased human health impacts to Native populations and other Arctic residents. Large gaps exist in our scientific knowledge of the Arctic and the application of this knowledge to the nature, causes, effects, and control of diseases. The current institutional framework for the conduct and support of Arctic health research is inadequate. In addition to the striking in adequacies in the physiological data base available for Arctic research, no medical or health research units exist to assess problems related to occupational safety and health or long-term environmental health consequences of life in the Arctic.

In addition to the need to study the effects and costs of developmental and defense activities in the Arctic to minimize the costs in terms of human lives and health, a variety of research activities exist

in the Arctic which could provide findings to humankind in other geographic areas. These activities include:

Research into paralytic shellfish poisoning or zoonotic disease;
Hepatitis B infection and vaccine efficacy studies;
Invasive Hemophilus influenze disease; and
Dietary effect on lipoproteins, prostanglandins, and atherosclerosis.

Other issues related to human habitation would benefit from a program of Arstic research based on a comprehensive policy. Improving technologies such as building engineering, would provide a valuable service to local residents. Information transfer and the adaptation of existing methods are part of the process; so is identifying and implementing small-scale technologies to suit the scattered population. In the area of basic research, even though much work has been done, additional data about soil properties and mechanics, especially erosion and permafrost, are needed. This information will improve building design and construction and assist in the engineering of roads, airports, and similar facilities. Erosion—the retreat of beaches and banks along the Arctic coast—is a continuing problem. In populated areas, such as Barrow, erosion has been accelerated by the use of coastal deposits for onshore construction (e.g., road and airport fill). Knowledge about tundra erosion is needed as well.

Basic research also would be useful into the particular hydrological properties of the Arctic water cycle. The interaction of factors like temperature and flooding need to be explored. For example, the Department of the Interior, in its December 1981 Section 1007 ANILCA report, notes that its researchers were unable to sample some streams to determine fisheries potentials because of high water conditions that caused excessive turbulence and turbidity.

In surveying rivers and lakes to identify potential winter water availability and to ascertain the location of hazards such as overflowing ice, Interior Department investigators found that river flows fluctuated widely. A better understanding of the factors contributing to such conditions would be helpful before water treatment plants are installed.

Applied research is critical if technologies are to be appropriately adopted. Especially advantageous are small-scale technologies that address immediate probems. The use of synthetic insulation in place of gravel for protection of the permafrost under buildings is an example. Another is the substitution of incineration or biodegradation for traditional sewage treatment.

V. Section-by-Section Analysis

Sections One and Two—Title, Findings and Purpose

The Arctic is critical to national needs with respect to energy independence, commercial assets, and national defense. Continued Arctic development will require new technologies and the means to mitigate the effects of development on Arctic residents and wildlife.

Current Federal research is fragmented, underfunded, and uncoordinated. There is no Federal policy in place to guide and coordinate these efforts. Additionally, the United States lags behind other Arctic rim nations in terms of Arctic research and technology.

In order to expand the Arctic "data base" and fill existing gaps in our knowledge of and data about the Arctic, the Federal Government should develop and implement a national Arctic research policy and focus its efforts on the collection and characterization of basic Arctic scientific data which is essential to our Nation's needs.

S. 373 would establish an Arctic Science Policy Council and an Arctic Research Commission to promote Arctic Research. It would also mandate the establishment of a centralized system for the collection, organization and distribution of scientific data on the Arctic. It would establish broad research priorities and support to Arctic research that is currently being neglected and is essential to our Nation's needs.

This act is not an attempt to create a new "super agency" to dictate to Federal agencies what their scientific research goals in the Arctic should be. On the contrary, existing agencies should greatly benefit from the centralization of research data. The act is also not a substitute for the funding of existing research projects underway in the Arctic. The purpose of this act is to fund currently neglected areas of research essential to the Nation's needs that might not lie solely within the purview of any Federal agency. The act is also not an attempt to conduct State research under a Federal aegis: National needs and interests are the focus of the act. However, since there is some spillover benefit to the State of Alaska, it was felt that the State should contribute to the Arctic Research Fund created by the act in return for a proportional degree of policy input.

Section Three—Arctic Science Policy Council

The five-member Arctic Science Policy Council would be charged with developing a comprehensive Arctic Research Policy.

The President would appoint each of the five members, with the Chairperson's appointment occurring with the advice and consent of the Senate. Two of the members would be selected by the President from lists submitted by the Secretaries of Commerce, Defense, Interior, Energy, State, and the Secretary of Transportation—on behalf of the Coast Guard—and the Director of the National Science Foundation. All of these departments or agencies are highly active in some form of Arctic research, and the Coast Guard is given special mention because of its direct experience in the Arctic. The two individuals nominated for selection by the above departments and agencies should have background in Arctic research.

The remaining members of the Council will be selected by the President from a list submitted by the Governor of the State of Alaska. Like their Federal counterparts, these representatives should also have background in Arctic research. While the committee assumes that the Governor's appointees will probably be residents of the State of Alaska, nothing in this act should be interpreted as disallowing any or all of the other members from being residents of Alaska.

Section three also specifies several other administrative provisions related to the Council:

Each member will have an equal vote on matters decided by the Council.

The terms of the initial members of the Council will vary from 1 to 2 years in order that the entire council not be subject to reap-

pointment at the same time. In the event that the President fails to appoint a successor, the Council member may serve after the expiration of his term. Council members may be reappointed.

Members of the Council would be paid a daily rate equal to the daily equivalent of the rate for level V of the Executive Schedule under section 5316 of Title 5, USC, for each day the member is engaged in the actual performance of his duties as a member of the Council, but in no case would the member be compensated for more than 90 days of service per year, nor would a member who is employed by the State of Alaska or the U.S. Government be entitled to additional compensation.

The Council meetings would be held at a time and place determined by the Chairman, and they would be held as often as the Chairman determines is needed to fulfill his duties as specified in section 4 of the act.

Members of the Council would be reimbursed for travel and expenses regardless of whether or not they are otherwise employed by the State of Alaska or the U.S. Government.

The committee also expects that some full-time staff may be deemed necessary by the members of the Council in order to fulfill their duties. The Council shall select and compensate staff in a manner it deems appropriate.

Section Four—Duties of Council

The Council's main purpose is to develop and supervise an integrated national Arctic science policy. This policy should be developed with the cooperation of the Governor of the State of Alaska or with the State agencies the Governor may designate. The committee recognizes that the State of Alaska is in the process of developing an Arctic reearch policy of its own, and that the Federal policy should be compatible with and complementary to the State's policy.

Not later than January 31 of each year, the Council shall publish a statement of goals and objectives with respect to Arctic research in order to guide the Arctic Research Commission—described more fully later in this report—in the performance of its duties. The Council shall also provide Congress, prior to January 31 of each year, a report describing the activities and accomplishments of the Council during the preceding calendar year.

The Council shall take steps to facilitate cooperation between the Federal Government and State and local governments with respect to Arctic research. The Council will also attempt to facilitate cooperation between Federal agencies, although it should be made clear that the committee does not intend the Council to dictate research goals to Federal agencies. Federal agencies which conduct Arctic research in the pursuit of their established missions should continue to do so. The Council would, however, in conjunction with the Commission, survey existing Federal research efforts, compare those efforts with stated policy goals, and act to address research gaps which exist in areas important to the Nation's needs.

The committee envisions that the Council and the Commission will also be in a position to help facilitate cooperative research efforts with other nations in consultation with the Department of State.

Section Five—Cooperation with the Council

The committee expects Federal agencies to cooperate fully with the Council. In that connection, the Council may acquire from any Federal agency unclassified data, reports, or other nonproprietary information the Council considers useful in the discharge of its duties. It is also anticipated that the Council may desire to utilize existing facilities and services of a Federal agency, and the committee expects the parties to reach reasonable agreements guiding that use. The committee includes a provision—section 5(b)—in order to provide for a wide variety of situations which might arise involving the use of temporary facilities, staff assistance, cooperative projects to develop policy guidelines, or similar situations.

Sections Six and Seven—The Arctic Research Commission

The act establishes a nine-member Arctic Research Commission appointed by the Arctic Science Policy Council. Its major purposes are to:

(1) Survey existing research in both the public and private sectors;

(2) Establish a Data Collection and Retrieval Center in the State of Alaska to serve as a central clearinghouse for non-proprietary and unclassified research data; and

(3) Make grants for Arctic research pursuant to the policy goals established by the Council.

Four of the nine Commission members shall be individuals with scientific credentials and expertise in the physical, biological, health, and social sciences. At least one of this group of four should be employed or professionally associated with the University of Alaska, although nothing in this act should preclude more or all of this group from being professionally associated with the University of Alaska. Also, while specific scientific disciplines are mentioned in the Statute, the committee does not intend that all disciplines must be represented. For instance, if the Council, in accordance with the policy goals it establishes, determines that the Commission should have two biological and two physical scientists on the Commission in lieu of scientists from the other disciplines, the committee does not want to deny the Council that opportunity.

Two members of the Arctic Research Commission shall be appointed from among residents of the Arctic who are representative of the needs and interests of Arctic residents and live in areas affected by Arctic resource development. It is the committee's expectation that these members would be from the aboriginal groups, because they have a long historical association with the Arctic and comprise a majority of the permanent Arctic residents. Native representation at this level is both desirable and appropriate.

Two members of the Commission shall be appointed from among individuals familiar with the Arctic and representative of the needs and interests of private industry undertaking resource development in the Arctic. Clearly, private industry has undertaken a great deal of applied Arctic research. The expertise developed in conjunction with Arctic resource development will be of clear benefit to the Commission in the performance of its duties. Moreover, private industry

is particularly familiar with the Federal permit processes described in the GAO report mentioned earlier in this report. The committee shares the view of the General Accounting Office that Federal permit processes can be improved if additional research is undertaken to identify what new permitting procedures may be necessary and what existing procedures may be excessive. Federal agencies, because they are not equipped with adequate information and scientific data, are inclined to be over-cautious in promulgating developmental guidelines and issuing permits. The Clean Water Act Section 404 "wetlands" permit process, which must generally be followed in the course of developmental activities in Alaska, has been the target of many such complaints.

The final member of the Commission shall be a civilian employee or uniformed member of the U.S. Coast Guard. The committee recognizes that the Coast Guard's mission includes the operation of icebreakers and protection of the ocean environment and resources. This has given the Coast Guard considerable past and present experience in Arctic matters.

It should be stressed that the research initiatives funded by the Commission should chiefly consist of initiatives above and beyond those currently conducted by existing Federal agencies. The committee does not intend that Arctic research funds (accumulated pursuant to sections 9 and 100 of this act) be used for research mandated by other Federal law or required in the course of a Federal agency's Arctic mission. The Commission's initiatives should instead be focused on *currently neglected* areas of research important in the context of the general policy goals and priorities articulated by the Policy Council.

The Council and Commission should consult closely on programs and studies funded by the Commission, recommendations proposed by the Commissions on future research needs, and guidelines for administering and awarding Arctic research grants. Section 6 also requires the Commission to make an annual public report to the Council. This report should describe the Commission's activities during the preceding year in addition to making policy recommendations to the Council.

Finally, the Commission shall cooperate fully with the Governor and the agencies of the State of Alaska on its recommendations for future research; the planning, funding, and logistical support of Arctic research; and the collection and dissemination of data.

Section Eight

This section contains general administrative authorities allowing the Commission to appoint staff and to secure supplies, office space, services and property as may be necessary.

Sections Nine and Ten—State election and the Arctic research fund

The committee anticipates that the State of Alaska will choose to participate in the Arctic Science Policy Council and the Arctic Research Commission, contributing to the Arctic research fund a sum

equal to at least one-fourth of the amount appropriated to the fund by Congress during the previous year. In the event Congress appropriated $20 million in a given fiscal year, the State would be expected to provide an unencumbered appropriation of $5 million *minus*:

The fair market value of goods and services, of facilities, materials, and other support the state contributes to the Council, the Commission, and the data collection and retrieval center during that Fiscal Year; and

The amounts contributed by private individuals and organizations.

In the event that the expected State contribution exceeded the share required for the State to continue its participation, the State would not be eligible for refunds from the fund.

The State of Alaska's decision not to participate would result in the termination of the appointments to the Council or Commission made from among individuals nominated by the Governor pursuant to section 3(b)(2). The committee has included this language as an added incentive to tne State of Alaska to participate.

The Fund shall be available for the support of the data collection and retrieval center, the research grants made by the Commission, and the other activities of the Arctic Science Policy Council and the Arctic Research Commission. S. 373 authorizes $25 million annually for fiscal years 1984, 1985, 1986, 1987 and 1988.

Section Eleven—Definition of the Arctic

The act defines the term "Arctic" to mean all United States and foreign territory north of the Arctic Circle, *plus* all U.S. territory north and west of the boundary formed by the Porcupine, Yukon, and Kuskokwim Rivers; all contiguous seas, including the Arctic Ocean and the Beaufort, Bering, and Chukchi Seas, and the Aleutian chain. The Arctic is defined in this manner recognizing that the presence of Arctic conditions are not confined to the geographical areas north of the Arctic Circle, but includes subarctic areas as well.

VI. Estimated Cost of the Legislation

U.S. Congress,
Congressional Budget Office,
Washington, D.C., March 23, 1983.

Hon. William V. Roth, Jr.,
Chairman, Committee on Governmental Affairs, U.S. Senate, Washington, D.C.

Dear Mr. Chairman: Pursuant to Section 403 of the Congressional Budget Act of 1974, the Congressional Budget Office has prepared the attached cost estimate for S. 373, the Arctic Research and Policy Act of 1983.

Should the Committee so desire, we would be pleased to provide further details on this estimate.

Sincerely,

James Blum
(For Alice M. Rivlin, Director).

CONGRESSIONAL BUDGET OFFICE COST ESTIMATE

MARCH 23, 1983.

1. Bill number: S. 373.
2. Bill title: Arctic Research and Policy Act of 1983.
3. Bill status: As ordered reported by the Senate Committee on Governmental Affairs, March 17, 1983.
4. Bill purpose: The bill establishes the Arctic Science Policy Council and the Arctic Research Commission to promote Arctic research. The Council is mandated to promote cooperation among federal agencies, and to develop an integrated national Arctic science policy. The Commission is directed to survey Arctic research, determine priorities, establish a data collection and retrieval center, and make grants for Arctic research. The State of Alaska may elect to participate in the activities of the Council and Commissions. To participate, Alaska must contribute an amount equal to one-quarter of the appropriation. An Arctic Research Fund is established, to consist of appropriations, contributions from Alaska, and any private contributions, to be used for supporting the activities of the Council and Commission.
5. Estimated cost to the Federal Government:

	Millions
Authorization level:	
Fiscal year:	
1984	-----
1985	$25
1986	25
1987	25
1988	25
Estimated outlays:	
Fiscal year:	
1984	-----
1985	15
1986	25
1987	25
1988	25

The costs of this bill fall within budget function 250.

Basis of estimate: It was assumed that the bill would be enacted in fiscal year 1983 and that the amounts authorized will be appropriated.

Based on information provided by the Committee staff, CBO assumed that the Commission would not undertake any activities until fiscal year 1985, when the bill authorizes appropriations. Accordingly, it was assumed that the report required by the bill to be submitted by September 30, 1984, would be delayed until sometime in fiscal year 1985.

The bill authorizes the appropriation to the Arctic Research Fund of $25 million for each fiscal year, from 1985 through 1989, for activities of the Council and Commission. The estimated outlays are based on the spending experience of similar programs.

6. Estimated cost to State and local governments: In addition to the authorization of federal funds, the State of Alaska may also contribute to the Arctic Research Fund. If Alaska chooses to participate in the Council and Commission, the fund would receive from Alaska and have available for expenditure about $6 million annually, in addition to the $25 million authorized.

The estimated cost to Alaska for participating is equal to one-quarter of the appropriation, as provided in the bill.

7. Estimate comparison: None.
8. Previous CBO estimate: None.
9. Estimate prepared by: Jeff Nitta.
10. Estimate approved by:

James L. Blum, Assistant Director for Budget Analysis.

VII. Rollcall Vote in Committee

In compliance with paragraph 7(c) of rule XXVI of the Standing Rules of the Senate, the rollcall vote taken during Committee consideration of this legislation is as follows:

Final passage: Ordered reported, 10 yeas; 0 nays.

YEAS (10)	NAYS (0)
Percy	
Stevens	
Cohen	
Durenberger	
Rudman	
Cochran	
Eagleton	
Sasser	
Levin	
Roth	

VIII. Evaluation of Regulatory Impact

Paragraph 11(b)(1) of Rule XXVI requires each report accompanying a bill to evaluate "the regulatory impact which would be incurred in carrying out the bill."

S. 373 will not have any direct regulatory impact. It does not authorize any additional regulation of activities in the private sector, impose any new record keeping or reporting requirements on any segment of the public, or abolish any existing regulations.

IX. Changes in Existing Law

Rule XXVI of the Standing Rules of the Senate requires that changes in existing law made by the bill, as reported, be detailed in the Committee Report accompanying the bill. No changes in existing law are necessitated by S. 373, as amended.

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